

Heterophrynyus armiger Pocock, 1902 (Amblypygi: Phrynididae): First record from Colombia, with notes on its historic distribution records and natural history

Carlos Víquez^{1*}, Daniel Chirivi², Jairo A. Moreno-González³ and James A. Christensen⁴

1 Instituto Nacional de Biodiversidad (INBio), Santo Domingo, Heredia, P. O. Box 22-3100, Costa Rica.

2 Pontificia Universidad Javeriana, Laboratorio de Entomología, Bogotá, Colombia.

3 Universidad del Valle, Departamento de Biología, Sección de Entomología, Ciudad Universitaria Meléndez Calle 13 No 100-00, Santiago de Cali, Valle del Cauca, Colombia.

4 Minden Pictures/Foto Natura, 558 Main Street Watsonville, CA, 95076, USA.

* Corresponding Author. E-mail: cviquez@inbio.ac.cr

ABSTRACT: The phrynid whip spider *Heterophrynyus armiger* is herein cited for the first time from a precise locality in Colombia. Additional data on its natural history are provided. This species has been found in disturbed and preserved forest areas of Isla Gorgona, an island located at the northwest coast of Colombia.

In Colombia, 10 species of Amblypygids are well known: five species are members of the subfamily Phrynninae Wood, 1863, including four from the genus *Phrynyus* Lamarck, 1801 (*Phrynyus araya* Colmenares & Villarreal, 2008, *Phrynyus gervaisii* (Pocock, 1894), *Phrynyus panche* Armas & Angarita, 2008 and *Phrynyus pulchripes* (Pocock, 1894)), and one species is from the genus *Paraphrynyus* (*Paraphrynyus laevifrons* (Pocock, 1894) Chiriví and Armas 2012); and six species are from the subfamily Heterophrynninae Pocock, 1902, genus *Heterophrynyus* Pocock, 1894, including *Heterophrynyus armiger* Pocock, 1902, (Giupponi and Kury 2013, cited without locality data or references, here we add new records with precise localities), *Heterophrynyus batesii* (Butler, 1873), *Heterophrynyus boterorum* Giupponi & Kury 2013, *Heterophrynyus cervinus* Pocock, 1894, *Heterophrynyus cheiracanthus* (Gervais, 1842) (Giupponi and Kury 2013, cited without a precise locality or references) and *Heterophrynyus silviae* Giupponi & Kury, 2013. The genus *Heterophrynyus* is restricted to the Amazon region and adjacent areas of South America and currently includes 12 described species worldwide (Giupponi and Kury 2013). In addition, there are records of the family Charinidae from at least five departments within Colombia without specific determination (Armas *et al.* 2012).

The individuals of *H. armiger* found in the Colombian collections represent the first records of this species of amblypygid in the country for which exact data on collections and localities exist. Additionally, new data on the distribution and natural history of *H. armiger* is presented here.

During the Workshop of Biological Collections 3.0 organized by the Global Biodiversity Information Facility (GBIF) and Infraestructura Iberoamericana de Información sobre Biodiversidad (I3B) in October 2012 and sponsored by the “Claustro de San Agustín, Instituto Humboldt, Villa de Leyva, Colombia”, the first author had the opportunity to review several specimens of Amblypygi preserved in alcohol deposited at the Arthropod Collection, Instituto

Alexander von Humboldt (IAvH) (<http://biocol.org/urn:lsid:biocol.org:col:1022>), third author reviewed the Collection of the Entomological Museum of Universidad del Valle, Cali, Valle del Cauca department, Colombia. (Museo de Entomología de la Universidad del Valle-MUSENUV). At collection of Arthropod Collection, Instituto Alexander von Humboldt (IAvH), all specimens found were identified to species level. There we found one specimen of *Phrynyus gervaisii* and seven specimens of undetermined *Heterophrynyus* spp., identified as *H. armiger* and *H. batesii*. Additionally, the collection of the Entomological Museum (MUSENUV) of the Universidad del Valle, Cali, Valle del Cauca, Colombia was revised, and additional specimens of *H. armiger* collected from Isla Gorgona (Gorgona Island), Guapi municipality, Cauca department, Colombia was added to the research.

The general terminology and morphology follow Quintero (1981) and Weygoldt (2000); measurements were recorded in millimeters (mm) using calipers of unknown brand, while images were recorded with an Olympus EM-5 digital camera and a Canon Powershot A3100 IS.

Map images were retrieved from www.maps.google.com/maps (Google 2013) and edited using image software.

Examined specimens. *Heterophrynyus armiger*. COLOMBIA: One adult male (IAvH without number), Cauca department, Guapi municipality, Natural National Park (N.N.P.) Gorgona, Isla Gorgona, Village 5m, March 5, 1990, inside a house. M. L. Baena, one adult male (IAvH 100861), in a house, April 23 of 1991, active manual search, Javier Portilla, two adult males (IAvH 100860, 100862), October 20, 1991, between bricks and construction material, Manual collection, Ever Solis, all specimens were geo-located to approximately 2°57'53" N, -78°10'30" W, at 13 m.a.s.l; one adult female (MUSENUV- 24303), Sendero Cerro Los Micos (Path hill Los Micos), 2°58'20.5" N, -78°10'38.8" W, 162 m.a.s.l, October 21, 2010, manual collection, Equipo de Zoología UV; one adult male and one juvenile (MUSENUV-

24304), Playa palmeras (Palms beach), 2°56'28.6" N, -78°12'21.4" W, 28 m.a.s.l., February 24, 2011, nocturnal sampling, manual search, Julian Mendivil; one adult male (MUSENUV- 24307), El Poblado (The Village), 2°57'15.8" N, -78°10'6.6" W, 8 m.a.s.l., December 2, 1989, found dying, Grupo de Insectos "Color Verde Pasto"; one adult female (MUSENUV- 24306), El Poblado (The Village), 2°57'15.8" N, -78°10'6.6" W, 8 m.a.s.l., September of 1989, M. Baena. Almost all material held by MUSENUV was obtained during the investigation project: "Assessing the Current State of Wildlife Conservation in Gorgona Island: A Holistic Approach to Ecological Assessment of the NNP Gorgona," with financial support from the Fund for Environmental Action and Childhood, International Conservation Colombia, Universidad del Valle, and the SQUALUS Foundation, Cali, Columbia. This project was covered by a study permit on biological research: PIDB-DTSO-0111-10.

Additionally, we reviewed specimens of the species *Heterophrynyus batesii* (Butler, 1873): one adult female and two adult males (IAVH without collection number), Huila Department, S.O. Acevedo. P.N.N. Cueva de los Guácharos, Cedros sector, Indio Cave, manual collection, December 5, 2001; D. Campos y E. González. 1850 m.a.s.l. (1°36'59" N, 76°06'15" W).

Heterophrynyus armiger Pocock, 1902
(Figures. 1 A-C, 2, 3, 4, 5 A-B, Table 1)

General morphology. The specimen examined at the IAvH collections is congruent with Pocock (1902) and Weygoldt (2002) in terms of characteristics and description; in particular, this specimen has reddish-brown coloration and shows a granular cuticle (Figures 1-3), the ocular tubercle and lateral eyes are very high, and the pedipalp femur ventrally shows a smaller spine (FIII) between the 2nd and 3rd long spines (Figure 1). Male genitalia and female gonopods and claw-like sclerites correspond with descriptions by Weygoldt (2002) (Figure 5).

Specimen distribution. ECUADOR: This specimen was originally cited to occur in "Pambelar" (Pocock 1902). Apparently, "Pambelar" is a typographical mistake; this citation may possibly refers to Pambilar or the Forest of Pambilar, located near the town of Malimpia, in the province of Esmeraldas, Ecuador; geo-located at approximately 97 m.a.s.l, (0°24'59" N, 79°26'36" W). Pocock (1903) cited, and adds under this species name, two more specimens from Butim, northern Ecuador (locality name not found on a map) and another from Durango River, NW Ecuador, Esmeraldas Province, at approximately 61 m.a.s.l, (1°05'09"N, 78°41'45"W). A photo accessible on-line at <http://www.flickr.com/photos/primevalnature/6051525033/in/set->

72157627512443268/, by © James A. Christensen shows an additional specimen from Mindo, Pichincha Province, Ecuador (0°03'07"N, 78°46'29"W). COLOMBIA: Cauca Department, N.N.P. Isla Gorgona (New record), (Figure 4).

Natural History. During the periods February to April and September, October and December, 1989 through 2011, six adult males, 2 females and one juvenile specimen were collected in different materials and localities in "El Poblado" (The Village) on Isla Gorgona. Some specimens were found within a house or among bricks or other construction materials; apparently the species is well adapted to disturbed environments. However, some individuals were observed on or among leaf litter at the base of trees inside the forest (J. Mendivil, pers. comm.). Previously, only information concerning a specimen's description and morphology was known.

Isla Gorgona is a small (26 km²) volcanic island located about 35 km off the coast of Colombia. Precipitation averages almost 7,000 mm annually, with the most intense rainfall occurring in September and October. The average relative humidity is 90% and the average annual temperature is 27°C. Topography is steep as would be expected of a volcanic island with elevations ranging from sea level to 338 m. The island housed a penal colony that was closed in 1984. Today, the island is a national park and the tropical forest vegetation that had been highly disturbed is in the process of early secondary forest succession (Rangel 1995; Giraldo 2012).

The new record from Isla Gorgona could be accounted for by the fact that during the Pleistocene, sea level was about 120 meters lower than present, which would have placed the island much closer to, but not connected to, the continent (Alberico 1986). This proximity could explain the similarity between flora and fauna between the coastal region and the island. However, any such similarity appears to be stronger between island-mainland biota further to the south (e.g., Ecuador; and Nariño department, Colombia) rather than in the northern pacific region (e.g., Chocó department, Colombia) (Alberico 1986; Lourenço and Flórez 1989).

The *Heterophrynyus* specimen pictured in Figures 2 and 3 was found in the nature preserve of the Hacienda San Vicente (The Yellow House), Mindo, Pichincha, Ecuador at an elevation of approximately 1450 m.a.s.l. This area is covered by both primary and old secondary cloud forest; the immediate vicinity of the site was old secondary forest. The specimen was found along the embankment of the 'main trail' through the reserve, essentially a jeep track, within a few centimeters of an un-occupied rodent burrow. The photos were taken after dark on 26 March 2011.



FIGURE 1. *Heterophrynxus armiger* (Male), specimen from Colombia. A, Ventral aspect of pedipalp tibia; B, General aspect of carapace and abdomen, dorsal view; C, Ventral aspect of pedipalp femur.

TABLE 1. Measurements (mm) of *Heterophrynxus armiger*. H, height; L, length.

	Colombia (Male without number)	Colombia (Female MUSENUV-24303)	Ecuador (Record from Pocock 1902)
Carapace, H/L	14.13/11	16.2/10.2	16.5/11.5
Abdomen, H/L	10.5/17.4	11.7/19.2	--/--
Total length	28.4	29.4	34
Pedipalp, L:			
Femur	13.3	14.3	17.5
Tibia	14.1	17.2	20
Basitarsus	6.6	8.2	8 (hand)
Distitarsus	5	5.8	--
Femur of leg I, L	35.3	35	54
Femur of leg IV, L	23	25	28



FIGURE 2. *Heterophrynxus armiger* (Male) specimen from Ecuador. Frontal view of live specimen. By James A. Christensen/Minden Pictures/Foto Natura.



FIGURE 3. *Heterophrynxus armiger* (Male) specimen from Ecuador. Dorsal view of live specimen. By James A. Christensen/Minden Pictures/Foto Natura.



FIGURE 4. Geographic distribution of *Heterophrynxus armiger*; red circles show new records from Colombia and Ecuador; blue stars show registered records from Ecuador (Pocock 1902, 1903).

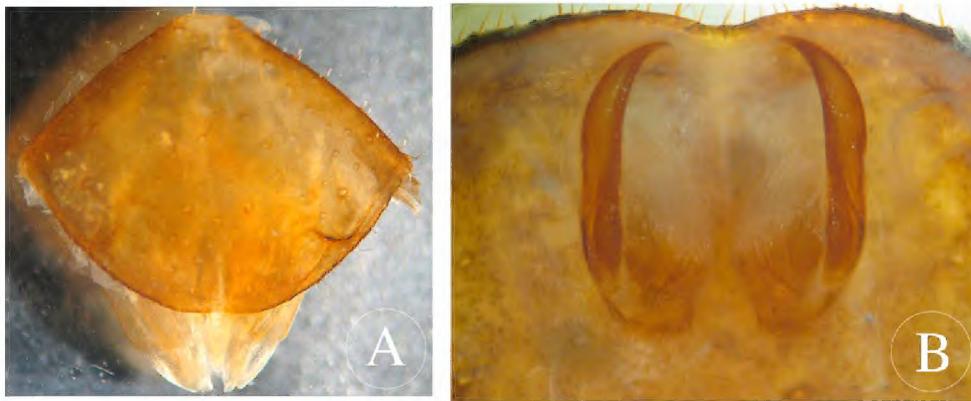


FIGURE 5. Genitalia of *Heterophrynxus armiger* specimens from Colombia (MUSENUV-24303, 24304). A, male ventral view; B, female, dorsal view.

ACKNOWLEDGMENTS: We are indebted to Claudia Alejandra Medina, Scientific Coordinator of Biological Collections, Instituto Alexander von Humboldt (IAVH), who was very kind to permit and assist with the review of collections under her care; to Biol. Ricardo Botero Trujillo, who facilitated the review of several loaned specimens; to Oscar Orrego and Juan Carlos Bello from the Instituto Alexander von Humboldt for their hospitality and help during the visit to Colombia; to Carmen E. Posso (Univalle) for her help during the revision of amblypygid materials

housed in MUSENUV; and to Francisco Pando and Cristina Villaverde (GBIF España) for their assistance and support during the workshop. Many thanks to Raimond P. Guries for make a review of the proper English of the document. The visit of the first author to Colombia was supported by the 3rd Workshop on Biological Collections organized by Instituto Alexander von Humboldt, SIB Colombia, I3B and GBIF.

LITERATURE CITED

Alberico, M. 1986. Biogeografía terrestre; pp. 224–243, in: H. von Prahl and M. Alberico (ed.). *Isla Gorgona*. Bogotá: Biblioteca textos universitarios, Banco Popular.

Armas, L.F. De, D.C. Joya, R.B. Trujillo, G.P. Camacho and S. García. 2012. Presencia en Colombia de la Familia Charinidae (Arachnida: Amblypygi). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A)* 50: 321–322.

Giraldo, A. 2012. Geomorfología e hidroclimatología de Isla Gorgona; pp. 17–23, in: A. Giraldo and B. Valencia (ed.). *Isla Gorgona: Paraíso de Biodiversidad y Ciencia*. Cali: Programa Editorial De La Universidad Del Valle.

Giupponi, A.P.L. and A.B. Kury. 2013. Two new species of *Heterophrynxus* Pocock, 1894 from Colombia with distribution notes and a new synonymy (Arachnida: Amblypygi, Phrynididae). *Zootaxa* 3647(2): 329–342.

Google, 2013. Google Maps. *General aspect of America, map of Colombia and Ecuador*. Available at www.maps.google.com/maps. Captured on January 2013.

Harvey, M.S. 2003. *Catalogue of the smaller arachnid orders of the World: Amblypygi, Uropygi, Schizomida, Palpigradi, Ricinulei and Solifugae*. Collingwood Victoria: CSIRO Publishing. Collingwood Victoria, Australia. 385 pp.

Lourenço, W.R. and E. Flórez. 1989. Los escorpiones (Chelicerata) de Colombia, la fauna de la Isla Gorgona, aproximación biogeográfica. *Caldasia* 16: 66–70.

Pocock, R.I. 1902. A contribution to the systematics of the Pedipalpi. Part I. A revision of the generic names of the Amblypygi. *Annals and Magazine of Natural History* 7(9): 157–165.

Pocock, R.I. 1903. Description of four new Arachnida of the orders Pedipalpi, Solifugae, and Araneae. *Annals and Magazine of Natural History* 7(11): 220–226.

Quintero, D. 1981. The amblypygid genus *Phrynxus* in the Americas (Amblypygi, Phrynididae). *Journal of Arachnology* 9(2): 117–166.

Rangel, O. 1995. *Colombia Diversidad Biótica* I. Bogotá D.C: Guadalupe Ltda, 442 pp.

Weygoldt, P. 2000. *Whip Spiders (Chelicerata: Amblypygi): Their Biology, Morphology and Systematics*. Stenstrup: Apollo Books. 163 pp.

Weygoldt, P. 2002. Amblypygi; pp. 293–302, in: J. Adis. (ed). *Amazonian Arachnida and Myriapoda*. Sofia: Pensoft Publishers.

RECEIVED: February 2013

ACCEPTED: February 2014

PUBLISHED ONLINE: May 2014

EDITORIAL RESPONSIBILITY: Ana Lúcia Tourinho